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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/534,043	03/24/2000	Toshiaki Shinohara	0057-2608-2YY	3123

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EXAMINER	
CHU, CHRIS C	
ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 04/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/534,043	SHINOHARA ET AL.	
	Examiner	Art Unit	
	Chris C. Chu	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1, 3 - 10, 13 and 14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *7, 13 and 14* is/are allowed.

6)☐ Claim(s) *1,4, 6 and 8 ~ 10* is/are rejected.

7)☒ Claim(s) *3 and 5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *04 January 2002* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. The applicant's amendment filed on January 4, 2002 has been received and entered in this office action.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the thickness of said second metal plate is equal to the thickness of said first metal plate in claim 3, lines 4 and 5, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, a cylindrical case in claim 9, line 14, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

4. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect may be deferred until after the examiner has considered the proposed drawing correction. Failure to timely submit the proposed drawing correction will result in the abandonment of the application.

On page 7, paragraph 1, applicant argues "[A]ccordingly, ... an arbitrary thickness and their detailed illustration is not essential for one of ordinary skill in the art to have a proper understanding of the invention. At least for this reason, the applicant respectfully request reconsideration of the objection to the drawings under 37 C.F.R. 1.83(a)." Applicant request to withdrawn the drawing objection is fully considered but not persuasive because "not essential" is not equivalent to conventional. Since the thickness is claimed, applicant is required to show this feature in the drawings.

Claim Objections

5. Claim 8 is objected to because of the following informalities: remove "and" in line 7. Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose et al. in view of McCormick.

Regarding claim 1, Hirose et al. discloses in Fig. 16B and column 10, lines 16 ~ 19 a semiconductor module mountable on an external heat sink (5), the semiconductor module comprising:

- an insulating substrate (1, 11 and 8) for the semiconductor module, the insulating substrate (1, 11 and 8) including a substrate (1), a first conductive pattern (8) formed on a first main surface of the substrate which is on the opposite side from the external heat sink, and a second conductive pattern (11) formed on a second main surface of the substrate which is on the same side as the external heat sink and for contact with the external heat sink; and
- a mounting frame (3) made of metal and having a mounting surface for contact with the external heat sink, the mounting frame (3) including a flange along a periphery thereof for engagement with a peripheral part of the

insulating substrate at the first main surface, the flange pressing the peripheral part of the insulating substrate toward the external heat sink.

As to the language on lines 10 ~ 12 of claim 1, the phrase "to force the insulating substrate into pressure contact with the external heat sink" is functional language which does not differentiate the claimed apparatus from Hirose et al.

Hirose et al. does not disclose the mounting frame which includes: a first metal plate and a second metal plate

McCormick discloses in Fig. 2A a mounting frame which includes:

- a first metal plate (220) having a mounting surface and
- a second metal plate (206) disposed on the first metal plate and having a protrusion along a periphery thereof projecting from a periphery of the first metal plate to define a flange.

It would have been obvious to one of ordinary skill in the art at the time of the present invention was made to use the first metal plate and the second metal plate of McCormick as the mounting frame in the device of Hirose et al. in order to provide a technique of tape-mounting a semiconductor device as taught by McCormick in column 9, lines 48 ~ 50.

Regarding claim 4, Hirose et al. discloses in Fig. 16B the insulating substrate (1) further includes a third conductive pattern (2) formed on the first main surface along a periphery of the substrate; and the flange and the insulating substrate (1) contact each other, with the third conductive pattern (2) therebetween.

Regarding claim 6, Hirose et al. discloses in Fig. 16B the insulating substrate (1) further includes a third conductive pattern (2) formed on the first main surface along a periphery of the substrate; and the flange and the insulating substrate (1) contact each other, with the third conductive pattern (2) therebetween.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose et al. in view of Mertol.

Hirose et al. discloses in Fig. 16B and column 10, lines 16 ~ 19 a semiconductor module mountable on an external heat sink (5), the semiconductor module comprising:

- an insulating substrate (1, 11, and 8) for the semiconductor module, the insulating substrate (1, 11, and 8) including a substrate (1), a first conductive pattern (8) formed on a first main surface of the substrate which is on the opposite side from the external heat sink, and a second conductive pattern (11) formed on a second main surface of the substrate which is on the same side as the external heat sink and for contact with the external heat sink;
- a mounting frame (3) made of metal and having a mounting surface for contact with the external heat sink, the mounting frame (3) including a flange along a periphery thereof for engagement with a peripheral part of the insulating substrate at the first main surface, the flange pressing the peripheral part of the insulating substrate toward the external heat sink to force the insulating substrate into pressure contact with the external heat sink,

- wherein the substrate, the first conductive pattern and the second conductive pattern of the insulating substrate have respective peripheries in alignment with each other, and
- wherein the flange presses the periphery of the first conductive pattern on which a semiconductor element is mounted toward the external heat sink.

Hirose et al. does not disclose an insulative material between the flange and the first conductive pattern. However, Mertol discloses in Fig. 8 an insulative material (6) between the flange (16) and the first conductive pattern. It would have been obvious to one of ordinary skill in the art at the time of the present invention was made to add the insulative material of Mertol in the device of Hirose et al. in order to increase security of the stiffener to the substrate as taught by Mertol in column 7, lines 37 ~ 39.

9. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose et al. in view of Oshima et al.

Hirose et al. discloses in Fig. 1; column 10, lines 16 ~ 19; and column 6, line 29 a semiconductor module mountable on an external heat sink (5), the semiconductor module comprising:

- an insulating substrate (1, 11, and 8) for the semiconductor module, the insulating substrate (1, 11, and 8) including a substrate (1), a first conductive pattern (8) formed on a first main surface of the substrate which is on the opposite side from the external heat sink, and a second conductive pattern (11)

formed on a second main surface of the substrate which is on the same side as the external heat sink and for contact with the external heat sink;

- a mounting frame (3) made of metal and having a mounting surface for contact with the external heat sink, the mounting frame (3) including a flange along a periphery thereof for engagement with a peripheral part of the insulating substrate at the first main surface, the flange pressing the peripheral part of the insulating substrate toward the external heat sink to force the insulating substrate into pressure contact with the external heat sink,
- a semiconductor device (6) mounted on the first conductive pattern;
- a case (10) disposed on a main surface of the mounting frame which is on the opposite side from the external heat sink;
- the case, the mounting frame and the insulating substrate defining a space surrounding said semiconductor device; and
- an insulative sealing material filling said space

Hirose et al. does not disclose a cylindrical case. However, Oshima et al. discloses in Fig. 1A and column 11, line 53 a cylindrical case (101). It would have been obvious to one of ordinary skill in the art at the time of the present invention was made to use the cylindrical case of Oshima et al. in the device of Hirose et al. in order to contain a power control semiconductor element and a control element inside the cylindrical case as taught by Oshima et al. in column 2, lines 33 ~ 36.

Regarding claim 10, Hirose et al. discloses in column 6, lines 45 ~ 47 the sealing material is a thermosetting resin.

Allowable Subject Matter

10. Claims 7, 13 and 14 are allowed.

11. Claims 3 and 5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 3 contains allowable subject matter because none of references of record teach or suggest, either singularly or in combination, at least the limitation of a thickness of a first metal plate being equal to the sum of a thickness of a substrate and a thickness of a second conductive pattern.

Claim 5 contains allowable subject matter because none of references of record teach or suggest, either singularly or in combination, at least the limitation of an adhesive filling a gap between part of a flange which is out of contact with a third conductive pattern and a first main surface.

12. The following is an examiner's statement of reasons for allowance:

Regarding claims 13 and 14, the prior art of record does not teach or suggest, either singularly or in combination, at least the "the bottom surface of the second

conductive pattern is curved because of a difference in thickness between a central part of the second conductive pattern and a peripheral part thereof."

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

13. Applicant's arguments with respect to claims 1, 4 and 8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
March 21, 2002

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800